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ABSTRACT

Key factors influencing the decision to attend private school are identified in this paper. It looks at the factors accounting for varying rates of private school attendance and estimates the responsiveness of such attendance to government support. It studies the variation in private school attendance rates at three levels: across states, across districts in California, and across census tracts within the San Francisco Bay Area. At each level, the authors analyze which economic, social, religious, and ethnic characteristics are significantly related to private school choice. Findings indicate that the concentration of Catholic families is positively associated with parochial school attendance. Family income is, in general, a significant factor in explaining nonparochial school enrollments. Parochial school attendance rates are less responsive to income changes than are nonparochial rates. Estimates of combined parochial and nonparochial income elasticity range between .54 and .95. Thus public policies to increase average family income through major tax cuts, a fixed limit tuition tax credit, or educational vouchers would increase private nonparochial enrollments by an estimated 0.54 to 0.95 percent for every 1 percent increase in average family income. Finally, private school attendance rates, particularly parochial school rates, are positively associated with higher proportions of minority students in the public school. (Author/JM)

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ANALYSIS OF THE CHOICE FOR PUBLIC AND PRIVATE EDUCATION

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Abstract

In this paper we identify some of the key factors which influence the decision to attend private school. We study the variation in private school attendance rates at three levels of aggregation: among the different states within the United States; among unified school districts in California; and among census tracts within the San Francisco Bay Area. At each level of aggregation, we analyze which economic, social, religious, and ethnic characteristics of the groups being studied are significantly related to the private school choice. While other analyses have sought to provide a rationale for government support of private schools in terms of efficiency and fairness, we confine our attention to the task of identifying the factors which account for the varying rates of private school attendance and of estimating the responsiveness of private school attendance to government support.

Introduction

Tuition Tax Credits and Alternative Policies

Current public discussion has focused on two sets of alternative policies for providing either direct or indirect support for private schools, namely tuition tax credits and educational vouchers. A significant literature has developed which provides a rationale for such assistance and considers issues of both efficiency and equity in the provision of educational services.[1] The present paper is directed to neither of these issues nor to the thorny legal issue of government provided aid to church related schools. We confine our analysis to the task of determining the factors which are responsible for the variations in private school enrollment rates and of estimating the responsiveness of private school attendance to government aid. We provide estimates of the responsiveness of private enrollments to income changes, but do not provide similar estimates for enrollment sensitivity to price changes, other than to review several other attempts at such estimation.

Public/Private School Enrollments: Relative Shares

In the absence of tuition tax credits and other major government assistance, a significant private school alternative to the public school system has existed. The most recent data available (Fall 1978) show that 10.65 percent of the nation's elementary and secondary enrollment was accounted for by private school enrollment, divided unequally between parochial schools (9.07%) and nonparochial schools (1.57%). Catholic schools accounted for three-fourths of the parochial enrollments.[2]

While more than one child in ten nationally attends private school, the pattern is far from uniform among the states. Table 1 presents data on the variation in private school enrollment rates in 1978 among the states. What systematic factors are associated with differing rates of private school attendance, whether parochial or nonparochial? How important are the various forces such as income and other socio-economic considerations as well as religious affiliation? Finally, what are the implications of these findings for public policy consideration of measures such as tuition tax credits or educational vouchers? These are the issues to be examined in this paper.

Populations to be Examined and the Units of Observation

Given the wide variations in private school enrollment rates indicated above, we want to examine in some detail the characteristics of the various states which might account for this variance. Thus, the first part of our empirical analysis utilizes the 50 states and the District of Columbia as our sample, with the individual state as our unit of observation. In this manner, regional variations might be examined along with other characteristics which differ among the states. Unfortunately, the most recent comprehensive data which are available are from the 1970 Census. A subsequent study is planned as soon as the 1980 Census data become available.

The second segment of the analysis utilizes data mapped by California's unified school districts. Here we utilize socio-economic data from the 1970 Census to examine the variations in private school enrollments across the unified school districts. Since these districts contain two-thirds of California's public school enrollment, the sample is quite

TABLE I

RANGE IN STATE-WIDE PRIVATE ELEMENTARY AND SECONDARY ENROLLMENT RATES, 1978

	Total Private	Non-Parochial	Parochial
Highest	17.21%	5.45%	15.89%
National Average	10.65%	1.57%	9.07%
Lowest	1.78%	0.05%	1.30%

Notes: The private enrollment rate equals the number of students enrolled in private schools divided by the total number of students enrolled in public and private schools.

2) National average is the unweighted average for the 50 states and the District of Columbia.

3) For the highest and lowest categories, total private enrollment rates need not be the sum of the parochial and nonparochial values since the state at the extreme under one category need not also be the extreme state under the other category. For the national average, however, the total rate is the sum of the parochial and nonparochial rates.

Source of Date: U.S. Department of Education, 1980 Digest of Education Statistics, Washington, D.C., 1981.

representative of the overall state-wide patterns.

Finer detail is provided by our final sample consisting of 650 Census Tracts in the San Francisco Bay Area. The use of this level of observation permits the testing of hypotheses related to the role of characteristics of the tract's population in explaining private school enrollments.

Individual family preferences cannot, of course, be estimated from these samples. A final section of this paper is directed toward the methodology to be employed in assessing such preferences. We do provide, however, tentative estimates of such policy relevant relationships as the income elasticity of the demand for private school enrollment.

The Decision to Attend Private School

A wide range of options faces a family selecting the optimal educational program for its child(ren). For a child enrolled in a public school, various "add-ons" such as remediation; classes in art, crafts, and music; enrichment classes for educationally advanced children; as well as sports programs might be available. Further, it should be recognized that four combinations exist in terms of the provision and the funding of these "add-ons".

ALTERNATIVES FOR PROVISION AND FUNDING OF EDUCATIONAL ADD-ONS

		Responsibility for Provision	
		Public	Private
Responsibility for Funding	Public	I	II
	Private	III	IV

As one example, after school music programs might be provided by public schools in some districts funded by taxpayers (as in I above), rather than the usual arrangement of privately provided lessons paid for privately (represented by IV above). Children enrolled in private schools may be faced with similar combinations of educational "add-ons".

Parents will select that combination of educational services deemed optimal, given its fiscal resources. Assuming that a family has made a choice of residence, privately funded school services would be selected only where the family prefers more educational service than that which are available through the publicly funded alternatives.[3]

The above discussion assumes that the family must select from a fixed set of alternatives available to it given a fixed residence. A consideration of the dynamics of the decision process poses additional alternatives. First, families can "vote with their feet" and move to a school district providing a preferred set of alternatives[4]. Second, through a variety of means, families may seek to influence the locally provided bundle of educational services. This would include voting in school referenda measures, voting for particular members of school boards, and bringing pressure to bear on school administrators and other decision makers. Finally, it should be recognized that the decision by a family to enroll a child in a private school may be but part of a broader decision strategy. That is, the family may seek to alter the bundle of publicly provided services, but may in the interim enroll children in the private alternative. Thus, it need not be inconsistent to find that parents of private school children vote for increases in public school spending, nor need this be interpreted as an altruistic act.[5]

From the discussion in the previous paragraphs, it should be clear that the proportion of children in a given community attending private school is conditioned upon the educational offerings of the public school and that these offerings (expenditure levels) are in turn affected by the proportion of students within the district's boundaries attending private schools. Thus, the process implied is one of joint determination. Whereas the above analysis has focused on the individual family in its decision making process, we need to aggregate the many conflicting individual demand curves into one for the community as a whole. The public

choice process based on the median voter models assumes that the public decision is tipped by the median voter. Thus, the characteristics of the median voter enter as arguments in the standard analysis. However, it has found that specifications based on the mean characteristics may be preferred both theoretically as well as empirically.[6]

While the complete decision model including the demand for educational add-ons is not described here, the process may be adequately specified as one where public school expenditures and private enrollments are jointly determined as described in equations I and II below:[7]

I. $CUREXP = f(PRVATE, TAXPRC, INCOME, TASTE1, e_1)$

II. $PRVATE = g(CUREXP, INCOME, PRICE, TASTE2, e_2)$

Where: CUREXP = Current expenditure per student in the public schools

PRVATE = Percent of students within the district's boundary attending private schools

TAXPRC = Tax price of public education

INCOME = Mean family income

PRICE = Price of private education (tuition, fees, etc.)

TASTE1, TASTE2 = Vectors of exogenous characteristics conditioning taste for education, public and private

$e_1 e_2$ = Normally distributed random error terms

The impact of private school enrollment rates on public school current expenditure is ambiguous. With an increased private enrollment fewer families receive direct benefits from the public schools, which might reduce support for those schools. On the other hand, from a given total school outlay, an increased private enrollment implies higher spending

per public school enrollee. Further, high private school enrollments, particularly nonparochial enrollments, may reflect a strong "taste" for education, both public and private. Public school expenditure is expected to be negatively associated with the tax price and positively associated with income.

Private enrollments are expected to be negatively associated with public school quality. The current expenditure per student is but a rough index of quality and other measures such as class size and student performance measures could be included as well. Income is expected to have a positive impact on private school enrollments, while a higher price (including tuition, fees, transportation costs and the like) should reduce private school enrollments.

The factors conditioning "taste" for private and public education include a variety of demographic, socio-economic, and race/ethnic characteristics. We note that one of the principal advantages of the private school alternative is the variety of choice which is offered to the family. While the public school by its nature must serve all of the constituents within the district, private schools can target their services to certain subgroups. These subgroups might be identified according to academic preferences (e.g. college prep, concentration on the 'basics', broadened academic curriculum); religious preferences; or socio-economic considerations. Among the characteristics which might affect the family's choice are the education level and occupation of the parents, migration pattern of the family, race/ethnic background, and religious affiliation.

Unfortunately for analytical purposes, income may act not only as a budget constraint but also as a taste factor due to its collinearity with some of the characteristics, such as the educational level of the parent or occupation of the parent. A further complication is introduced by the existence of expenditure limits such as are now in effect in California. Under such conditions, equation 1 would properly specify the desired expenditure which could diverge significantly from actual expenditure. As private enrollments are expected to be negatively associated with current expenditures in the public school, the impact of a ceiling on spending could prompt additional parents to switch their children from public schools to private schools.[8] In the case of expenditure limits, Equation II which specifies private school enrollment rates, should include the actual current expenditure per student as an argument, as well as a term depicting the deviation between the desired level of spending. With this structure, the hypothesis that the further spending falls below the desired level, the greater the private school enrollment rate could be tested.

A family's public/private school choice can also be conditioned on how representative a family is of the community in which it lives. For example, parents with an above average level of education might desire an above average quality of education for their children. This increased quality could be achieved by choosing to attend a private school which will offer the desired level of quality. The probability that the switch is made might depend on the level of homogeneity in the family's community. If all of the adults in the community have levels of education which are

above the state-wide average, then it is likely that all of the families will desire a quality of education which is above the state-wide average. In this case, there might not be any need to seek a private alternative to the public school; in some sense, the public school becomes a private school with the choice of residence as one of the entrance requirements. However, if this family with the above-average level of education resided in a community in which there is a wide variance in the educational background of the residents, then it is likely that the quality of the public school will correspond to that desired by the family. If the disparity becomes large enough, a move from the public school to the private alternative will be made. This variance in community attributes might be important with respect to a number of the characteristics mentioned already. One of the goals of this paper is to test this community variance hypothesis.

Interstate Patterns of Private School Enrollment

As displayed earlier in Table 1, the percentage of students attending private schools varies greatly among the different states. There are, moreover, significant regional differences in these rates. As may be seen in Table 2, parochial school attendance rates are highest in the Northeast and North Central states, having approximately twice the rate that is found in the South and the West. On the other hand, the South has the highest private nonparochial enrollment rate--over three times the rate for the North Central states. While these variations in enrollment rates may reflect purely regional differences in the "taste" for private education, there are important social and economic differences among the regions which may account for some of these regional variations. In Tables 3A, 3B, and 3C, we present the simple correlation coefficients between private elementary and private high school attendance rates for the 50 States and District of Columbia and six important characteristics of the states.

For both elementary and secondary parochial schools (Table 3A), the regional variables are highly significant: for the Northeast and North Central regions the association is positive, while for the South and the West, it is negative.[9] Income is positively and significantly associated with parochial school attendance, as is the degree of urbanization of the state. The association between parochial school attendance and black and other minority concentrations is insignificant.

Church affiliations may have an important impact on the choice between public schools on the one hand, and private parochial or nonparochial schools on the other. Unfortunately, direct measures of religious

TABLE 2

REGIONAL VARIATIONS IN PUBLIC AND PRIVATE SCHOOL ENROLLMENT RATES: 1978

Region	Percentage of Students Enrolled in:			
	Public	Total Private	Parochial	Nonparochial
Northeast	84.77	15.23	13.46	1.77
North Central	88.28	11.72	11.11	.61
South	92.02	7.98	5.76	2.22
West	91.62	8.38	6.76	1.62

Source of Data: U.S. Department of Education, 1980 Digest of Education Statistics, Washington, D. C. 1981.

preferences are not available. However, since parochial schools are predominantly Catholic, the percentage of the population whose parents (one or both) migrated from heavily Catholic European countries was used as a proxy for the percentage of the population who are Catholic.[10] Not unexpectedly, parochial attendance rates were highly correlated with this proxy variable.

Regional variations are also significant for private nonparochial schools: attendance rates are significantly lower for both elementary and high schools in the North Central states; elementary rates are higher in the South; and high school attendance rates are higher in the Northeast. (Table 3B). Median family income is positively associated with nonparochial high school attendance rates and negatively associated with nonparochial elementary attendance rates (although per capita personal income is insignificant). For several reasons, this result does not imply that families with increased incomes would tend to transfer their children from private schools to public schools. First, these are simple correlations, where the independent effect of individual variables is not separated. Second, even if we found that a negative relationship existed after standardizing for all other relevant factors, we cannot identify the income of the families attending private school from the state-wide averages. It is entirely possible that in states with low incomes, upper income families may increasingly seek out private alternatives. This issue is examined further in later sections.

Total private attendance rates, both parochial and nonparochial, are examined in Table 3C. Not surprisingly, the results closely parallel

those for parochial schools since parochial attendance is the much larger part of the total.

In an effort to separate the socio-economic, ethnic, and religious factors from "purely" regional characteristics, private school enrollment rates were regressed on the characteristics examined in the simple correlations described above. The results are displayed separately for elementary schools (Table 4A) and high schools (Table 4B). Given the high level of aggregation - the individual state as the unit of observation - parochial attendance rates (both elementary and secondary) are associated significantly only with the North Central regional variable and the percent Catholic. The former variable may reflect a relatively high concentration of Protestants, such as Lutherans in the Midwest, with a relatively strong preference for church-related schools.

Two variables, income and the percent minority, require further elaboration. Income is positively associated with high school attendance and is consistent with expectations concerning individual family behavior. However, net of the effect of regional variables and the percent minority, elementary private school enrollment rates fall with family income. As discussed earlier, given the present level of aggregation, this may reflect that higher income individuals in states where the average state income is low favor private schools. An unambiguous interpretation is not possible with state level data. Also, higher concentrations of minority member are associated with increased private nonparochial attendance rates. Based on a similar argument to that used in the case of income, this result does not imply that the increased private attendance is by minority

students. Rather, it is more likely a reflection of whites seeking private schools for their children where schools have greater concentrations of minorities.

Table 3A

CORRELATION BETWEEN PAROCHIAL SCHOOL ATTENDANCE AND SELECTED CHARACTERISTICS, 50 STATES AND DISTRICT OF COLUMBIA, 1970

	Correlation Coefficient Between Selected Characteristics and the Percentage of Students Attending:	
Characteristic	Parochial Elementary	Parochial High School
Region of Country		
Northeast	.521*	.542*
North Central	.403*	.331*
South	.427*	-.409*
West	-.386*	-.354*
Income		
Median Family Income, 1969	.487*	.511*
Per Capita Personal Income, 1970	.471*	.540*
Demographic/Ethnic/Religious		
Percent Urban Population	.404*	.430*
Black as Percent of Population	-.165	-.084
Minority as Percent of Population	-.243	-.160
Catholic as Percent of Population	.741*	.766*

Notes: 1) N = 51
2) *indicates significance at the 5% level.
3) See text for calculation of percent Catholic
4) Unweighted Means: Parochial Elementary As Percent of Total Elementary: 7.55%
Parochial High School As Percent of Total High School: 5.15%

Sources of Data: 1970 Census of Population, General Population Characteristics, General Social and Economic Characteristics, United States Summary: 1979 Digest of Educational Statistics.

Table 3B

CORRELATION BETWEEN PRIVATE NONPAROCHIAL SCHOOL ATTENDANCE AND SELECTED CHARACTERISTICS, 50 STATES AND DISTRICT OF COLUMBIA, 1970

	Correlation Coefficient Between Selected Characteristics and the Percentage of Students Attending:	
Characteristic	Nonparochial Elementary	Nonparochial High School
Region of Country		
Northeast	-.045	.495*
North Central	-.544*	-.334*
South	.602*	.088
West	-.083	-.202
Income		
Median Family Income, 1969	-.308*	.362*
Per capita personal Income, 1970	-.222	.487*
Demographic/Ethnic/Religious		
Percent Urban Population	-.049	.381*
Black as Percent of Population	.541*	.336*
Minority as Percent of Population	.634*	.541*
Catholic as Percent of Population	-.218	.404*

Notes: 1) N = 51
2) *indicates significance at the 5% level
3) See text for calculation of percent Catholic
4) Unweighted Means: Private Nonparochial Elementary as Percent of Total Elementary: 2.35%
Private Nonparochial High School as Percent of Total High School: 3.02%

Sources of Data: 1970 Census of Population, General Population Characteristics, General Social and Economic Characteristics, United States Summary; 1979 Digest of Educational Statistics.

Table 3C

CORRELATION BETWEEN TOTAL PRIVATE (PAROCHIAL AND NONPAROCHIAL) SCHOOL ATTENDANCE AND SELECTED CHARACTERISTICS, 50 STATES AND DISTRICT OF COLUMBIA, 1970

	Correlation Coefficient Between Selected Characteristics and the Percentage of Students Attending:	
Characteristics	Private Elementary	Private High School
Region of Country		
Northeast	.533*	.620*
North Central	.261	.123
South	-.269	-.283*
West	-.430*	-.357*
Income		
Median Family Income, 1969	.419*	.542*
Per capita personal Income, 1970	.428*	.615*
Demographic/Ethnic/Religious		
Percent Urban Population	.409*	.487*
Black as Percent of Population	-.012	.070
Minority as Percent of Population	-.066	.093
Catholic as Percent of Population	.712*	.758*

Notes: 1) N = 51
2) *indicates significance at the 5% level.
3) See text for calculation of percent Catholic
4) Unweighted Means: Total Private Elementary as Percent of Total Elementary: 9.90%
Total Private High School as Percent of Total High School: 8.17%

Sources of Data: 1970 Census of Population, General Population Characteristics, General Social and Economic Characteristics, United States Summary; 1979 Digest of Educational Statistics.

Table 4A

REGRESSION EQUATIONS EXPLAINING PAROCHIAL, NONPAROCHIAL, AND TOTAL PRIVATE ELEMENTARY SCHOOL ENROLLMENT RATES, 50 STATES AND DISTRICT OF COLUMBIA, 1970

(Standard Errors in Parentheses)

Independent Variable	Dependent Variable: Percentage Attending Parochial	Percentage Attending Nonparochial	Total Percentage Attending Private
North Central	5.137* (.915)	-1.499* (.423)	1.381 (1.742)
South	---	.052 (.525)	-2.422 (2.032)
West	---	-.436 (.416)	-3.932* (1.882)
Mean Family Income ($1000's)	---	-.214 (.114)	
Percent Minority	---	-.052* (.012)	.065 (.036)
Percent Catholic	1.234* (.124)	---	.929* (.212)
Constant Term	2.904	4.094	7.966
RSQD (adjusted)	.716	.610	.616
S.E.E.	2.771	.939	3.071
N	51	51	51

*Indicates significance at the 5% level.

Sources of Data: 1970 Census of Population, General Population Characteristics, General Social and Economic Characteristics, United States Summary; 1979 Digest of Educational Statistics.

Table 4B

REGRESSION EQUATIONS EXPLAINING PAROCHIAL, NONPAROCHIAL, AND TOTAL PRIVATE HIGH SCHOOL ENROLLMENT RATES, 50 STATES AND DISTRICT OF COLUMBIA, 1970
(Standard Errors in Parentheses)

	Dependent Variable:		
Independent Variable	Percentage Attending Parochial	Percentage Attending Nonparochial	Total Percentage Attending Private
North Central	2.923* (.648)	-2.889* (.431)	- .970 (1.375)
South	---	-2.516* (.534)	-4.658* (1.604)
West	---	-2.945* (.424)	-4.559* (1.486)
Mean Family Income ($1000's)	---	.323* (.116)	---
Percent Minority	---	.085* (.012)	.131* (.029)
Percent Catholic	.872* (.088)	---	.820* (.167)
Constant Term	2.039	1.226	7.159
RSQD (adjusted)	.697	.724	.716
S.E.E.	1.961	.956	2.425
N	51	51	51

*Indicates significance at the 5% level.

Sources of Data: 1970 Census of Population, General Population Characteristics, General Social and Economic Characteristics, United States Summary; 1979 Digest of Educational Statistics.

Intrastate Patterns in Private School Enrollment Rates: The California Case

As depicted earlier, wide variations in the private school enrollment rates exist among the states. In this section, we turn our attention to variations within a single state. Our sample consists of 234 of the 240 unified school districts which were in existence in California at the time of the 1970 Census. The sample is quite representative of the school districts in California: two-thirds of the total public school enrollment are included in these districts. The data presented in Table 5 suggests that a wide variation in enrollment rates exists across districts in California. At one extreme, there are cases in which no students living within a unified district attended private schools. At the other extreme, there are cases in which approximately one-quarter of the students living within the unified district's boundaries attended private schools.

Results of Correlation Analysis

We seek to uncover those factors which might account for the wide variations noted above. As a first step toward identifying those key factors, we present in Table 6 the simple correlation coefficients between private school enrollment rates and selected characteristics of the district.

The characteristics, average daily attendance (ADA) and total population test for the effect of size on the decision to enroll in private schools. Large districts, particularly those in heavily urbanized areas tend to have a multitude of social problems over which individual families have limited control. Thus, we would expect a higher private school enrollment rate in larger districts; as expected, the correlation is

positive, although it is not significant for nonparochial schools. The variables referring to age distribution are included as an indirect test for several effects. The percentage of the population aged 5 through 18 is largely a reflection of family size; for a given average income, larger family size would imply a reduced ability to fund private schooling. The higher the percentage of elderly (aged 65 and over) in a district, the lower might be the support for public schools since the elderly receive few direct benefits from public schools, yet pay for them through property taxes and other taxes. A negative correlation coefficient for both of these age distribution characteristics is expected.

The cluster of socio-economic characteristics requires little explanation. The level of income and income-related characteristics such as the percentage of residents who graduated from college and the percentage who are employed in professional occupations are positively correlated with private school attendance. Most of the coefficients are significant at the 5 percent level. Whether the income related variables have a significant association with private school attendance independent of their impact through income will be discussed in the section reporting on the regression results.

Higher public school quality is expected to reduce the movement to private schools. While quality and expenditure are clearly not synonymous, the level of expenditure per student is frequently perceived as an index of school quality. We include the level of current expenditures per student as well as the level of assessed valuation per student in our analysis. The latter measure is included as a proxy for expenditure,

since expenditure is itself influenced in part by socio-economic status variables, as well as being jointly determined with the decision to attend private school. Both measures of "school quality" are negatively associated with parochial school enrollment rates, but are positively associated with nonparochial rates.

Districts with large black and Asian student populations are associated with higher parochial school attendance rates; however, the same is not true for nonparochial private schools. Whether these factors are significant independent of their association with larger more urban populations or with areas with lower incomes cannot be determined through the use of simple correlation analysis.

Table 5

RANGE IN PRIVATE ELEMENTARY AND SECONDARY SCHOOL ENROLLMENT RATES AMONG CALIFORNIA'S UNIFIED SCHOOL DISTRICTS, 1970

	Total Private	Nonparochial	Parochial
Highest	27.70%	27.70%	24.62%
State Average*	5.35%	1.46%	3.89%
Lowest	0.00%	0.00%	0.00%

Notes: 1) The private enrollment rate equals the number of students living within the unified school district's boundaries who are enrolled in private schools divided by the total number of students living within the district's boundaries.

2) *State average is the unweighted average for the 234 unified districts in our sample.

3) For the highest and lowest categories, total private enrollment rate need not be the sum of the parochial and nonparochial values since the district at the extreme under one category need not also be the extreme district under the other category. For the state-wide average, however, the total rate is the sum of the parochial and nonparochial rates.

Sources of Data: California State Department of Education and 1970 Census of Population School District Fourth Count Tape.

Table 6

CORRELATION BETWEEN PRIVATE SCHOOL ATTENDANCE AND SELECTED DISTRICT CHARACTERISTICS, CALIFORNIA UNIFIED SCHOOL DISTRICTS, 1970

Characteristics	Correlation Coefficient Between Selected Characteristics and the Percentage of Students Attending: Parochial	Nonparochial	Total Private
Population: Size and Age Distribution			
Average Daily Attendance (ADA)	.209*	.059	.191*
Percent Aged 5 - 18	-.213*	-.172*	-.250*
Percent Aged 65 and over	-.047	.156*	.042
Total Population	.232*	.076	.217*
Socio-Economic Status			
Percent College Graduates	.298*	.321*	.391*
Percent Professional Occupations	.351*	.250*	.395*
Percent Unemployed	-.125	-.215*	-.204*
Percent in Poverty	-.371*	-.078	-.324*
Average Family Income	.330*	.324*	.416*
Median Family Income	.427*	.265*	.461*
Percent of Families with Income Below $4000	-.416*	-.058	-.349*
Percent of Families with Income Above $15,000	.446*	.321*	.504*
District Financial			
Assessed Value Per ADA	-.149*	.159*	-.035
Current Expenditure Per ADA	-.135*	.195*	-.007
Race/Ethnic Characteristics of Public School			
Black Students as Percent of Total	.263*	.072	.238*
Spanish Surname as Percent of Total	-.037	-.063	-.060
Asian Students as Percent of Total	.323*	.065	.281*
Total Minority Students as Percent of Total	.124	-.014	.083

Note: 1) Sample consists of 234 unified districts
2) *indicates significance at 5% level.

Sources of Data: California State Department of Education and 1970 Census of Population School District Fourth Count Tape.

Results of Regression Analysis

While it is clear that numerous systematic factors are significantly associated with the decision to attend either public or private schools, it is the independent impact of such measures on private school enrollment that is relevant for policy purposes. In Table 7 we present the results of a regression analysis which is intended to estimate the independent effect off the various factors on private school enrollments.

That income is still significantly associated with private school enrollment rates once other factors are considered may be seen in Table 7. However, while the impact of income on both parochial and nonparochial enrollment rates is positive as expected, the coefficient in the parochial equation is not significant at the 5 percent level. The implication is clear: nonparochial school attendance is more sensitive to income changes than is parochial school attendance. Thus, policies to raise family income through major tax cuts, tuition tax credits, or school service specific measures such as vouchers, would tend to have a greater impact on non-parochial enrollments than on parochial enrollments.

The higher the proportion of families with incomes below $4,000, the lower is the associated parochial school enrollment rate. However, the reverse is true for other private schools. This result need not be inconsistent with our expectation that the poor do not attend private schools for the most part; rather, this may reflect that the affluent in these districts are leaving for private schools.

The negative impact of the school aged population on parochial attendance is expected, since this factor reflects in large part larger family

size, and thus a reduced ability to fund private schools from a given family income. This factor was not significantly associated, however, with private nonparochial school attendance.

The higher the representation of black and Spanish surnamed students in the public schools, the higher is the proportion of the district's students attending parochial schools. Again, given the unit of observation, it is altogether likely that this result mainly reflects white students, rather than black or Spanish students, enrolling in parochial schools.

The last variable, current expenditure per ADA is included in an attempt to estimate the impact of public school quality on the choice of private schools. Parochial school enrollments are reduced where public school spending is high. However, nonparochial school attendance is positively associated with public school expenditure. There are several alternative explanations for this latter result. First, families with children in private, nonparochial schools might have a strong "taste" for education in general, and hence act to increase public school spending even though their children do not receive any direct benefit from public school expenditures.[11] Second, these families might support higher quality public education in the hope of reaching the quality level in the public schools and thus reduce their total school outlays.[12]

Both of these explanations imply joint determination of public school spending and private school enrollment. To minimize the effects of such joint determination, and also the feedback from income to expenditure, we ran separate regressions using assessed valuation per ADA as our inde-

pendent variable rather than current expenditures per ADA. No significant changes in the results occurred: the explanatory power of the equation declined slightly and the coefficients of the other variables remained stable.

The low explanatory power of our equations, particularly for non-parochial private enrollment rates, indicates the very strong possibility of other important factors affecting the public/private school decision process. The limitations of aggregate studies are examined in the last section along with proposed solutions.

Table 7

REGRESSION EQUATIONS EXPLAINING PAROCHIAL, NONPAROCHIAL, AND TOTAL PRIVATE SCHOOL ENROLLMENT RATES, CALIFORNIA UNIFIED SCHOOL DISTRICTS, 1970
(Standard Errors in Parentheses)

	Dependent Variable:		
Independent Variable	Percentage Attending Parochial	Percentage Attending Nonparochial	Total % Attending Private
Percent Population Aged 5 - 10	-.334* (.053)	---	-.386* (.071)
Percent Unemployed	---	-.235* (.118)	---
Mean Family Income ($1000's)	.116 (.079)	.306* (.059)	.445* (.107)
Percent of Families with Incomes Below $4000	-.248* (.042)	.083* (.029)	-.177* (.057)
Black Students as a Percentage of Total	.098* (.024)	---	.110* (.033)
Spanish Students as a Percentage of Total	.053* (.015)	---	.064* (.020)
Current Expenditure/ADA ($100's)	-.415* (.095)	.145* (.066)	-.295* (.128)
Constant Term	17.805	-3.649	14.741
RSQD (adjusted)	.365	.162	.316
S.E.E.	2.980	2.243	4.034
N	234	234	234

* indicates significance at the 5% level

Sources of Data: California State Department of Education and 1970 Census of Population School District Fourth Count Tape.

Local Patterns of Private School Enrollment Rates: The San Francisco Bay Area

In the past empirical sections we have discussed the pattern of private school attendance using both national data and state-wide data. Now, we move closer to the level at which the choice regarding school attendance is actually made. In this section of the paper we analyze the decision at the census tract level. We are attempting to identify those characteristics of residents of the census tracts that explain the variation in private school attendance observed across census tracts.

Within the state of California, there are two types of school districts: unified and non-unified. A unified district provides education for grades K-12. People who do not live in a unified district belong to two school districts, an elementary district which provides K-8 education and a high school district which provides education for grades 9-12. Thus, everyone in California belongs to a school district providing education services from grades K-12. We have identified all of those census tracts in the San Francisco SMSA which lie entirely within their respective type of district; most census tracts do fit this criteria and our sample includes 650 of the census tracts in the SMSA. For each tract, certain characteristics based on the 1970 census information are calculated; in addition, certain data concerning the school district to which the tract belongs is used in the analysis. A complete listing of the variables used and the sources of the data is given in Table A-3.

Results of Correlation Analysis

In Table 8, we list the simple correlation coefficients between the characteristics mentioned above and the percentage of students within the tract who attend private elementary school and private high school. In the sections which follow, we will briefly discuss some of the key variables and compare the expected relationships to the coefficients reported in Table 8.

Income Variables. We assume that education is a normal good, thus the expected relationship between income and private school attendance is positive. The coefficients for mean family income, median income, and percentage of families with incomes at least three times the poverty level are all positively correlated with the percentage of students attending private school. The percentage of the tract's residents who have incomes below the poverty level is negatively correlated, again consistent with our expectations.

Taste Related Variables. There are a number of variables which affect the preferences of families for private education. Because of the extra expense associated with attending private school, we would expect that parents with larger families would be less inclined to send their children to private schools. This negative relationship is confirmed by the correlation coefficient. Since a large proportion of the private schools in the San Francisco Bay Area are parochial schools, it was expected that the religious makeup of the census tract would play a key role in the decision. Unfortunately, Census data do not provide information on the religious affiliation of individuals. As an indirect way of

achieving that information, we determined the percentage of residents who were either born or had at least one parent born in countries with a large Catholic population. It is this percentage which is referred to as the percentage Catholic in Table 8. As can be seen, this variable is highly correlated with private school attendance.

Two other characteristics which might give some insight into a person's demand for education are the level of education achieved by the parent and the occupation of the parent. Both the percentage of residents who are college graduates and the percentage of residents who work in professional occupations are positively correlated with private school attendance. The racial/ethnic composition of the tract is also investigated. The correlation coefficient for the percentage of the residents who are black is negative and significant; however, the coefficient for the percentage who are Spanish is not significant. Both of these results deserve some further comment. The results indicate that census tracts with a higher than average number of black residents have a below average percentage of students attending private schools. Unfortunately, this does not tell us whether it is the black residents or non-black residents (or both) who attend in less than average numbers. These coefficients are the simple correlation coefficients: the fact that blacks tend to have lower incomes than non-blacks, are less likely to be Catholics than non-blacks, and tend to have a lower educational achievement and lower representation in professional occupations than non-blacks, is important when interpreting these statistics, since each of the characteristics mentioned is positively correlated with private school attendance. Thus, we can't be sure, using

only the simple coefficients, if it is the racial composition of the tract or the socio-economic characteristics of the tract that are primarily responsible for the below average enrollment in private schools.

The percentage of residents who are Spanish-speaking and/or Spanish surnamed was a singled out for two reasons: it is quite a significant minority in California (the unweighted mean in the sample for this variable is 11.4% compared to 12.7% for Blacks); and second, although the great majority of Spanish-speaking people are Catholic, studies have indicated that Spanish-speaking Catholics are less likely to send their children to private school than non-Spanish speaking Catholics.[13] As a result of this second observation, we have not included this group in our estimate of the Catholic population. This approach seems to be supported by the correlation coefficients which indicate that the percentage of residents who are Spanish is not significantly correlated with the percentage of private school attendance.

Finally, we investigated the possibility that the length of time a family resided in the district might affect its choice of educational alternatives. We measured the percentage of families who had moved to their home within the five years before the census was taken, with the expectation that this variable would be negatively correlated with private school attendance. The hypothesis is that individuals who are fairly new to an area would be more likely to send their children to public school since the task of obtaining information on the quality of alternative public and private schools is somewhat time consuming. As expected, the correlation coefficient for this variable is negative.

Table 8

CORRELATION BETWEEN PERCENTAGE OF STUDENTS WITHIN A CENSUS TRACT ATTENDING PRIVATE SCHOOL AND SELECTED CHARACTERISTICS, SAN FRANCISCO SMSA, 1970

	Correlation Coefficient Between Selected Characteristics and Percentage of Students Attending:	
	Private Elementary School	Private High School
Characteristics of Census Tract		
Family Size	-.304*	-.320*
Percentage Catholic	.515*	.543*
Percentage Black	-.176*	-.173*
Percentage Spanish	-.047	-.037
Percentage College Graduate	.256*	.260*
Percentage in Professional Occupation	.250*	.248*
Percentage Moved to House Within 5 Years	-.167*	-.159*
Median Family Income	.177*	.168*
Mean Family Income	..233*	.247*
Percentage with Incomes 3 times poverty level	.259*	.247*
Percentage with Incomes Below Poverty Level	-.178*	-.153*
District Related Characteristics		
Average Daily Attendance	.380*	.422*
Reading Score	-.300*	-.205*
Class Size	-.356*	-.137*
Percentage Minority Students	.309*	.352*
Community Variance Characteristics[a]		
Percentage Black	-.278*	-.306*
Percentage Spanish	-.076*	-.056
Percentage College Graduates	.285*	.273*
Percentage in Professional Occupations	.285*	.273*
Mean Family Income	.321*	.320*
Percentage with Incomes 3 Times Poverty Level	.349*	.346*
Percentage with Incomes Below Poverty Level	-.304*	-.292*

[a]See text for explanation of variables.

* Indicates significance at 5% level.

Source of Data: 1970 Census, Census Tract Reports, Series PHC(1), San Francisco SMSA; California State Department of Education, Selected Statistics California State Department of Education, Results of State-wide Testing.

District Characteristics. The next group of variables relate to the characteristics of the school district to which the tract belongs. Average daily attendance (ADA) measures the size of the district. The expectation is that in a larger district, parents would feel that they had less input into the education process and might be more inclined to send their children to private schools. Also, the larger the district, the greater the possible variation among the schools and the greater the probability of intradistrict transfers of students. If private schools are viewed by parents as a way of offering more specialized curriculum or of treating more specialized students (however designated), parents in a large district would be more likely to send their children to private schools. As expected, the correlation coefficient for ADA is positive. Another important variable at the district level is the percentage of minority students. The correlation coefficient for this characteristic is positive: the percentage of students attending private schools is higher for those tracts located in districts with a higher percentage of minority students.

Because parents would be comparing the attributes of the two alternatives (public and private), the quality of the education being offered in the public school is an important variable. Other things equal, if the public school provides a higher (poorer) quality education, the percentage of students attending private school would be lower (higher). However, there are two types of problems involved with measuring a quality variable. First, it is the perception of the parent regarding the quality of the education that is relevant to the decision; short of interviewing the

individual parents there is no way to ascertain that perception. Second, apart from the fact that any quantifiable measure would be a second-best alternative, there are problems associated with the measures which have been traditionally used.

One measure which has been used is expenditures per student. We are unable to use this measure for our study because the California Department of Education does not compute expenditures per student separately for grades K-8 and 9-12 in unified districts. Since our sample contains both unified and non-unified districts, we have data on expenditures which are not comparable. There are two other measures which are available: average class size and scores on state-administered reading tests. Both of these measures suffer from problems. With respect to the class size, there is very little variation among the districts in the sample: 52 of the 56 districts have an average class size between 22.4 and 28.6 for grades K-8. While the reading scores do indicate something about the output of the schools, they neglect the capability of the students. For example, a moderately high reading score in a district with gifted children might indicate a poor educational product, while a moderately low score in a district with many disadvantaged children might suggest a highly successful effort. In defense of using the reading scores, we note that the perceptions of the parents are very important, and to the extent that the reading scores are reported in the newspapers, the perceptions of the parents might be influenced by the scores. Keeping all of this in mind, we note that the quality measures give conflicting results: the correlation coefficients suggest that a smaller class size is associated

with larger private school enrollments, while higher reading scores are associated with a lower private school enrollment.

Community Variance Variables. Finally, we list in Table 8 the correlation between what we have labelled community variance measures and private school attendance. These variables are derived by subtracting the value of the given characteristic for the district as a whole from the value of the same characteristic for the census tract. For example, for a tract in which 35% of the residents graduated from college, the variance measure would be 15% if that tract belonged to a district in which 20% of the residents graduated from college but would decrease to -5% if 40% of the district's residents graduated from college. The hypothesis suggested earlier is that it is the degree of difference among residents of a district that leads to the decision to attend private schools. Note that in each case, the correlation between private school attendance and community variance measure is greater than that between private school attendance and the corresponding absolute measure.

Regression Results

In this section of the paper, we report the results of a multivariate regression analysis using our sample of census tracts in the San Francisco SMSA. Three different regression equations are presented in Table 9. The dependent variable in each equation is the percentage of students within the census tract who attend private elementary school. The equations differ in the use of ADA, the percentage of minority students in the district, and the percentage of college graduates in the tract as independent variables.

Table 9

REGRESSION EQUATIONS EXPLAINING PRIVATE ELEMENTARY SCHOOL ATTENDANCE, CENSUS TRACTS, SAN FRANCISCO SMSA, 1970
(Standard Errors in Parentheses)

	Dependent Variable:		
	Percentage Attending Private School	Percentage Attending Private School	Percentage Attending Private School
Independent Variables:			
Family Size	-5.820* (1.525)	-5.698* (1.563)	-6.416* (1.497)
Percentage Catholic	1.127* (.113)	1.189* (.114)	1.172* (.114)
Mean Family Income ($1,000s)	.561* (.116)	.617* (.116)	.727* (.093)
ADA (thousands)	.142* (.030)	----	----
Reading Scores - 6th grade (statewide percentile)	-.072* (.025)	-.103* (.034)	-.109* (.033)
Variation in Percentage of College Graduates	.094** (.050)	.080 (.051)	----
Percentage of Minority Students in the District	----	.071* (.034)	.070* (.034)
Constant Term	11.954	13.294	13.786
RSQD (adjusted)	.423	.408	.406
S.E.E.	9.686	9.814	9.825
N	650	650	650

*Indicates significance at the 5% level
**Indicates significance at the 10% level.

Sources of Data: 1970 Census, Census Tract Reports, Series PHC (1), San Francisco SMSA ; California State Department of Education, Selected Statistics, 1969-70; California State Department of Education, Results of State-wide Testing.

The dominant feature of the equations is the importance of the Catholic variable. The coefficient is positive and strongly significant. This result is expected since the great majority of private elementary schools in the Bay Area are Catholic schools. It is also significant that when regression analysis is used, the reading scores for grade 6 become significant; the sign indicates that higher scores are associated with a lower private school enrollment.

The average income in the census tract is positively related to private school enrollment. When we compare the equations in columns 2 and 3 we find that the coefficient for average income increases when the college variable is deleted. The reason for this change lies in the relationship of those two variables. We have hypothesized that, other things equal, individuals with college educations will be more likely to prefer private education for their children. Of course, families in which the parents have completed college tend to have higher incomes than those families in which the parents have not graduated from college. Thus, when the college variable is omitted, the importance of the income variable is overstated, since it is also capturing this college-related preference for private school education. For policy purposes it is important to separate these two effects. If for example, incomes were to be increased through a tax cut or through a tuition tax credit, the purer income effect should be used to estimate the impact.

The variable ADA indicates that a tract located in a large school district would have a larger percentage of students in private school than an identical tract located in a smaller district. This result is

consistent with our earlier discussion regarding the impact of district size. At that time, we suggested that in a larger district, parents might feel that they had less input into the educational process and thus might be more inclined to send their children to private school. At this point we raise another reason for the positive coefficient for ADA. The larger districts in our sample often have an above average percentage of minority students enrolled, so that ADA might be acting, in part, as a measure of minority population. To test this possibility, we ran a separate equation with the percentage of minority students in the district as an independent variable to replace ADA. The coefficient for the minority student variable is significant with a positive sign, suggesting that tracts located in districts with high minority populations will have higher private school attendance.

In Table 10 the results of regression equations for our sample with the percentage of students attending private high school as the dependent variables are presented. Probably the most striking result is the close similarity between the coefficients in these two equations and the three equations reported in Table 9. The coefficients for the Catholic, family size, income, and college variables are quite similar. The only two variables for which there are any important differences are the reading score variable and the percentage of minority students. Unlike the elementary case, in the high school case the reading score is not a significant variable.

The one variable which appears in both sets of equations and for which there is a substantial difference is the minority student variable.

TABLE 10

REGRESSION EQUATIONS EXPLAINING PRIVATE HIGH SCHOOL ATTENDANCE, CENSUS TRACTS, SAN FRANCISCO SMSA, 1970
(Standard Errors in Parentheses)

	Dependent Variable:	
	Percentage Attending Private School	Percentage Attending Private School
Independent Variable:		
Family Size	-5.201 * (1.474)	-5.875* (1.424)
Percentage Catholic	1.211 * (.113)	1.187* (.113)
Average Income	.534 * (.120)	.675* (.088)
ADA (thousands)	.229 * (.060)	.211* (.060)
Variation in Percentage of College Graduates	.085** (.049)	----
Percentage of Minority Students in the District	.121 * (.022)	.131* (.021)
Constant Term	1.327	.835
RSQD (adjusted)	.456	.454
S.E.E.	9.496	9.510
N	650	650

* Indicates significance at the 5% level.

** Indicates significance at the 10% level.

Sources of Data: 1970 Census, Census Tract Reports, Series PHC (1), San Francisco SMSA; California State Department of Education, Selected Statistics, 1969-70; California State Department of Education, Results of State-wide Testing.

In the high school case, the coefficient for minority students in the district is almost twice as large as the coefficient in the elementary case. The "elasticity" of private school attendance related to minority enrollment is more than double in the high school case than that for the elementary case. An increase in minority enrollment in the elementary district of 10% would lead to a 2.1% increase in private school enrollment, while a similar increase of 10% in the high school case would yield a 4.4% increase in private school enrollment. This result could be due, in part, to the variation in the types of districts found in the Bay Area. The San Francisco SMSA consists of five counties: the county of San Francisco (coterminous with the city) and four suburban counties. In two of these counties, the dominant type of district is the unified district. Since this district provides education from grades K-12, the size of the district, as well as the socio-economic and racial composition does not change when we move from the elementary level to the high school level. However, in the other two counties, the dominant form of district is the elementary and high school district. In this case, a number of elementary districts are combined into a single high school district. Thus, if there are four relatively homogeneous (e.g. high income, low percentage of minority students) elementary districts merged with a larger elementary district which has more of a mix in racial and socio-economic composition, the resulting high school district looks quite different than the four elementary districts. It is quite possible that families in the four elementary districts will respond to this type of change by shifting from the public school at the elementary level to

private schools at the high school level.

As a final comment on the regression results, different sets of runs were made using the community variance variables in place of the absolute values. In all cases, the results were basically the same as the equations reported here. Thus, we conclude that at this level of aggregation, knowledge of the variation in the composition of the group does not explain behavior any better than knowledge of the absolute characteristics of the group.

A Test For Sensitivity. In Table 11 we present an example of how the estimate of private school enrollments based on our regression results respond to changes in several of the key variables. The first entry in the table indicates the estimated percentage of students attending private elementary schools in a hypothetical census tract which has values for the characteristics equal to the mean values for the entire sample. As indicated, the estimated percentage equals 12.23%. In the next three lines, we indicate the estimated percentage if one or two variables change with the rest of the variables remaining at their mean values. The new values chosen are designed to represent "high" values: they are set at a level for the characteristic which is two standard deviations away from the mean value.

The increase in the Catholic variable from the mean value to the "high" value brings about the largest increase in the percentage attending private school. The last line in the table indicates that if a high income tract was located in a high minority district, the percentage of private school enrollment would be about two percentage points higher than the

enrollment rate for a heavily Catholic tract which had the mean values for the other tract characteristics and was located in a district with a minority enrollment equal to the mean value.

Table 11

EXAMPLE OF SENSITIVITY OF KEY VARIABLES

Description of Characteristics	Estimated Percentage of Private Elementary Enrollment
All variables at mean values	12.23%
All variables but percentage Catholic at mean values Percentage Catholic = 13.13%	20.98%
All variables but average income and variation in college graduation at mean values Average income = $22,450 and Variation in college graduates = 20.1%	19.66%
All variables but Minority students in district at mean values Percentage of minority students = 63.9%	15.37%
Average income = $22,450; Variation in college graduates = 20.1% minority students = 63.9% All other variables at mean values	22.80%

Estimates based on coefficients reported in Table 9, column 2

Mean values for variables:		
	Family Size:	2.10
	Catholic:	5.37
	Avg. Income:	13.01
	Reading:	49.3
	College:	- 0.2
	Minority:	19.7

Responsiveness of Private School Attendance Rates to Changes in Incomes and Prices

Income and Private School Attendance

The major policy relevant issue addressed in this paper is the importance of income as a determinant of private school enrollment rates. How sensitive are parochial school enrollments to income change? How responsive are nonparochial enrollments?

Thus far, we have found that income is significantly associated with both nonparochial and parochial school enrollment rates, although the level of significance is generally lower in the parochial case. Now, we turn our attention to the issue of income sensitivity: the income elasticity of demand.

Tables 12 and 13 display estimates of the income elasticity of demand derived from the California unified school district sample and from the San Francisco Bay Area census tract sample. The former sample permits separate estimates of parochial and nonparochial responsiveness to income change. For example, a 1.0 percent increase in average family income is associated with a 0.34 percent increase in parochial enrollments. This conclusion must, however, be tempered with the finding that the regression coefficient from which it was derived was not significant at the usual 5% level. Private nonparochial enrollment appears to be highly responsive to income with an estimated income elasticity of 2.4. Thus, public policies to increase average family income through major tax cuts, a fixed limit tuition tax credit, or educational vouchers would increase private nonparochial enrollments by an estimated 2.4 percent for every 1 percent increase in average family income. Our estimates clearly reveal

nonparochial school attendance to be more sensitive to income changes than is parochial attendance. Given the greater relative importance of parochial enrollments in California (see Table 5), the .95 elasticity estimate for total private enrollments is consistent with the estimates of the component elasticities.

The elasticity estimates presented in Table 13 are derived from the Bay Area census tract sample and provide separate estimates for elementary and high schools. The estimates are derived from the regressions in Tables 9 and 10 and are calculated at the sample means. While these estimates are for parochial and nonparochial combined, they are consistently smaller (between 0.54 and 0.75) than the estimate (0.95) derived from the California unified school district sample. However, given the sample errors for the regression coefficients from which these estimates were derived, the differences are not significant at the 5% level.

Price Sensitivity of Private School Enrollment Demand

The estimates of the responsiveness of private school enrollment rates to changes in family income are relevant for such policy measures as tax cuts designed to increase family income, fixed dollar subsidies to families whose children attend school (vouchers), and tuition tax credits under certain conditions. Tax cuts, income subsidies, and vouchers all increase a family's income, but do not have a direct effect on relative prices (i.e., there is no substitution effect). Depending on the specific conditions of a tuition tax credit measure, there may be only an income effect, or there may be both an income effect and a substitution effect. When tuition tax credits are open-ended (a fixed proportion of the tuition

TABLE 12

RESPONSIVENESS OF PRIVATE SCHOOL ENROLLMENT RATES TO FAMILY INCOME: CALIFORNIA UNIFIED SCHOOL DISTRICTS: 1970

Parochial Schools	Nonparochial Schools	Total Private Schools
.342	2.399*	.954*

* Derived from regression coefficients significant at the 5% level.

Note: 1) All elasticities are estimated at the sample means.

Source: Derived from Table 7.

TABLE 13

RESPONSIVENESS OF PRIVATE SCHOOL ENROLLMENT RATES (BOTH PAROCHIAL AND NONPAROCHIAL) TO FAMILY INCOME: SAN FRANCISCO BAY AREA CENSUS TRACTS: 1970

Estimate	Total Private Elementary Schools	Total Private High Schools
I.	0.541 •	0.586 •
II.	0.595 •	
III.	0.701 •	0.740 •

• Derived from regression coefficients significant at the 5% level.

Note: 1) All elasticities are estimated at the sample means.

2) The elasticity estimates are aligned by comparable equations. The equations for estimate I include mean family income and variation in college graduation rates as independent variables. The equations for Estimate III include mean family income but do not include variation in college graduation rates as independent variables.

Source: Derived from Tables 9 and 10.

can be deducted from tax liability) there is a substitution effect and estimates of the price sensitivity of private enrollments are required to determine the policy impact. When there is a maximum to the amount that can be deducted, there is both an income effect and a substitution effect (requiring estimates of both income and price elasticity) up to the level of expendiutre where the maximum tax credit is realized, and only an income effect beyond that point (only income elasticity is relevant).

Several attempts have been made to estimate the price sensitivity of enrollments, but at best the results are mixed. Erekson estimated tuition responsiveness for parochial, nonparochial, and total private school enrollments in New York State. The nonparochial and total private school estimates had the expected negative effect, but the results were insignificant. The parochial school results were significant (above the 5% level), but the direction was the reverse of that expected, a result which Erekson suggested could imply that price is viewed as an index of quality.[14]

In an earlier study of the University of California enrollments, Hoenack found evidence that tuition sensitivity is related to income. The expectation is that low income individuals are more sensitive to tuition changes than are the more affluent.[15] This result points to the need for using the individual decision maker (rather than the school district) as the unit of observation in these types of studies.

Concluding Comments

Summary

We have documented the wide variations in the ratio of parochial and nonparochial private school enrollment rates. These variations exist

across states; among the four major regions of the country; within a state; and within a closely confined urbanized region. In all cases there are systematic factors which account for much of the observed variance in private attendance rates. The concentration of Catholic families is positively associated with parochial school attendance. Family income was, in general, a significant factor in explaining nonparochial school enrollments. Parochial school attendance rates were less responsive to income changes than were nonparochial rates. Estimates of combined parochial and nonparochial income elasticity ranged between 0.54 and 0.95. Private school attendance rates, particularly parochial school rates, are positively associated with higher proportions of minority students in the public schools.

Limitations of the Present Study

While the findings summarized above are policy relevant and significant, several limitations to the study must be recognized. The present study has drawn heavily on 1970 Census data. However, to estimate the impact of present policy alternatives on the public/private school enrollment decision, more recent data are preferred.

One obvious limitation to the study is the lack of an entirely satisfactory measure of religious affiliation. The proxy measure developed for the percent Catholic variable provided robust results, but hardly captures the preferences of Protestants and Jews for parochial schools. Alternative measures such as reported church membership per capita or number of churches per 1000 population could be used although there are serious problems with each measure. The preferred alternative, personal

religious affiliation, would be available only through the development of data using the family as the unit of observation.

The units of observation in our study have been geographic aggregates or government jurisdictions: states, school districts, and census tracts. While this approach yielded policy relevant information, some of the results cannot be unambiguously interpreted due to the problem of ecological inference. For example, the finding that high parochial school attendance existed in districts with heavy minority enrollment in the public school may imply less about the decisions of minorities than of whites. While moving the unit of observation from statewide districts to census tracts gets us closer to the actual decision making level, it is preferable to develop estimates utilizing the individual family as the unit of observation.

A final limitation has been the lack of a suitable private school price measure. Although the individual family can obtain the prices (tuition) of the relevant subset of private schools being considered, it is difficult for a researcher, short of interviewing individual families, to obtain this similar information. For example, <u>average</u> tuition may be low in a given community, but if the family's choice is further constrained by religious, school program, or environmental preferences, the <u>average</u> tuition in the community may be irrelevant. However, in the absence of such constraints, families in a given community are faced with the same set of prices (tuition and fees). In the San Francisco Bay Area for example, Marin County students attend private schools in San Francisco and <u>vice versa</u>; San Mateo County students may attend school in San Francisco,

etc. Price variations exist among the schools, but these variations dictate which schools the children attend not whether they attend private school. Thus, the lack of a suitable price variable is not an overriding limitation to the census tract study. However, the argument laid out above would not apply to the statewide study. There, the lack of a price variable is more serious. Unfortunately, the paucity of comprehensive published data on private school tuition has prevented us from including a price variable in the state-wide study.

The empirical results presented are ordinary least square estimates assuming a linear additive specification. This choice is arbitrary since no specific functional form can be specified a priori. A double logarithmic form, while equally arbitrary, has the advantage of providing direct estimates of elasticity coefficients for all variables. Elasticity estimates derived from our least square coefficients and computed at the sample means of the variables are presented in Tables A-4 and A-5.

One possibly serious problem with the linear probability model used in our analysis stems from the fact that the estimated dependent values may not fall in the range between 0 and 100%. The alternative to using the linear model is to use the logit model which guarantees that the estimated values will be within the required range. In subsequent analysis, some alternative nonlinear forms will be tested.

A Research Agenda

The limitations noted above lead us to propose several directions for future research on the public/private school enrollment decision. First, while aggregate level studies have the obvious limitation of not focusing

on the individual decision maker, important information can be obtained covering a broad population and at much lower cost than survey research directed at the individual as the unit of observation. Thus, we find it desirable to update the estimates provided here using 1980 Census data once they are available. Studies should be developed in other states as well to test the generality of the results presented here.

Second, with the increased availability of published data on private school tuition and fees, price indices need to be developed and their impact measured. While Erekson has made a major contribution utilizing New York State data, the extent of the relevant "market" is at issue, for his study assumes that the private market corresponds to the public school district boundary. This is, in all likelihood, too large for districts like Los Angeles and too small for compact suburban districts.

Finally, while survey research techniques are relatively costly, a major study of the individual family's educational choice is needed. Only in this manner can we ascertain the importance of preferences for specific programs and educational environments.

TABLE A-1

DESCRIPTIVE STATISTICS FOR DATA USED IN ANALYSIS OF INTERSTATE PATTERNS

Variable	Mean	Standard Deviation
* Total Private Elementary Enrollment Rate	9.90	4.96
* Parochial Elementary Enrollment Rate	7.55	5.20
* Nonparochial Elementary Enrollment Rate	2.35	1.48
* Total Private High School Enrollment Rate	8.17	4.58
* Parochial High School Enrollment Rate	5.15	3.57
* Nonparochial High School Enrollment Rate	3.02	1.84
** Median Family Income, 1969 ($1,000's)	9.20	1.48
** Per Capita Personal Income, 1970 ($1,000's)	3.70	.58
** Percent Urban	66.45	15.13
** Percentage Black	10.00	12.64
** Percentage Minority	12.84	14.08
** Percentage Catholic[a]	2.78	3.17

[a]See text for explanation of variable

Notes: 1) N = 51.

2) Means are the unweighted means for the 51 observations.

Sources of Data: * Indicates Digest of Educational Statistics, 1980

** Indicates 1970 Census

TABLE A-2

DESCRIPTIVE STATISTICS FOR DATA USED IN ANALYSIS OF INTRASTATE PATTERNS

Variable	Mean	Standard Deviation
* Total Private Enrollment Rate	5.35	4.90
* Parochial Enrollment Rate	3.89	3.77
* Nonparochial Enrollment Rate	1.46	2.45
* Average Daily Attendance (thousands)	12.42	44.98
* Percentage of Population Aged 5-18	28.07	4.52
* Percentage of Population Age 65 and over	10.15	5.17
* Total Population (thousands)	57.16	232.16
* Percentage of population college graduates	11.39	8.15
* Percentage of population in professional occupations	14.86	6.74
* Unemployment rate	3.46	1.30
* Percentage of families below poverty level	9.62	4.86
* Mean Family Income ($1000's)	11.48	3.41
* Median Family Income ($1000's)	10.02	2.61
* Percentage of Families with incomes of $4,000 or below	14.78	6.81
* Percentage of Families with incomes of $15,000 or above	22.28	11.93
** Assessed Valuation/Average Daily Attendance	19.89	14.52
** Current Expenditures ($100's)	8.13	2.26
** Black students as percentage of total	3.74	8.58
** Spanish students as percentage of total	15.12	15.49
** Asian students as percentage of total	1.31	1.72
** Minority students as percentage of total	20.18	18.05

Notes: 1) N = 234.

2) Means are the unweighted means for the 234 observations.

Source of Data: * Indicates 1970 Census
** Indicates State of California, Department of Education

TABLE A-3

DESCRIPTIVE STATISTICS FOR DATA USED IN ANALYSIS OF INTRASTATE PATTERNS

Variable		Mean	Standard Deviation
* Family Size		2.10	.28
* Percentage Catholic[a]		5.37	3.88
* Percentage Black		12.70	24.27
* Percentage Spanish		11.36	9.21
* Percentage College Graduates		16.51	13.54
* Percentage in Professional Occupations		17.49	10.48
* Percentage Moved to House in Last 5 Years		53.37	14.69
* Median Family Income ($1,000's)		11.80	3.96
* Mean Family Income ($1,000's)		13.01	4.72
* Percentage with Incomes at least 3 times poverty level		58.72	18.58
* Percentage with Incomes below poverty level		8.39	8.50
** Average Daily Attendance[a] (thousands)	-- Elementary	28.40	22.16
	High School	14.13	9.49
** Reading Score (statewide percentile)[a]	-- Elem.	49.50	28.46
	-- High	40.66	29.92
** Class Size [a]	-- Elementary	26.59	2.01
	-- High School	26.18	1.52
** Percentage Minority Students[a]	-- Elementary	40.62	27.47
	-- High School	40.17	26.85
* Private Elementary Enrollment Rate		13.49	12.74
* Private High School Enrollment Rate		11.86	12.88
Community Variance Variables:[b]			
* Percentage Black	-- Elementary	.69	20.11
	-- High School	.61	20.83
* Percentage Spanish	-- Elementary	-.39	7.81
	-- High School	-.45	7.89
* Percentage College Graduates	-- Elementary	-.02	10.06
	-- High School	.14	10.80
* Percentage in Professional Occupations	-- Elem.	-.51	8.40
	-- High	-.40	8.74

TABLE A-3 (cont.)

Variable		Mean	Standard Deviation
* Mean Family Income	-- Elementary	-.17	3.74
	--High School	-.11	4.17
* Percentage with Income at least 3 times poverty Level	-- Elementary	-1.02	15.88
	-- High School	-.93	16.40
* Percentage with Incomes below Poverty Level	-- Elem.	.76	7.47
	-- High	.77	7.54

[a] These variables are weighted by the number of tracts which belong to the school district. There are only 56 elementary and unified districts, but there are 650 tracts; thus, the larger districts are given a greater weight in deriving the means. This procedure does not affect the estimated means for reading score or class size very substantially, but does cause the mean listed in the table to vary from the unweighted mean for ADA and the percentage minority students.

[b] See text for explanation of variables

Notes: 1) N = 650.

2) Means are unweighted means for the 650 observations.

Sources of Data: *Indicates 1970 Census

** Indicates State of California, Department of Education

TABLE A-4

RESPONSIVENESS OF PRIVATE SCHOOL ENROLLMENT RATES IN UNIFIED SCHOOL DISTRICTS IN CALIFORNIA TO CHANGES IN KEY CHARACTERISTICS: AN ESTIMATE OF ELASTICITIES

Independent	Dependent Variable: Percentage Attending Parochial	Percentage Attending Nonparochial	Total Percentage Attending Private
Percent Population Aged 5 - 18	-2.410	----	-2.025
Unemployment Rate	---	-.557	---
Mean Family Income (1,000's)	.342	2.399	.954
Percentage of Families with Incomes below $4,000	-.942	.840	-.489
Black students as a percentage of total students	.094	---	.077
Spanish students as a percentage of total students	.206	---	.181
Current expenditures/ADA ($100's)	-.867	.807	-.448

Notes: 1) N = 234.

2) All elasticities are estimated at the sample means.

Source: Elasticities are derived from regression equations reported in text
column 1: Table 7, column 1.
column 2: Table 7, column 2.
column 3: Table 7, column 3.

TABLE A-5

RESPONSIVENESS OF PRIVATE SCHOOL ENROLLMENT RATES WITHIN CENSUS TRACTS IN SAN FRANCISCO BAY AREA TO CHANGES IN KEY CHARACTERISTICS: AN ESTIMATE OF ELASTICITIES

Variable	Dependent Variable: Percentage of Students Attending Private Elementary School	Elementary School	Elementary School	High School	High School
Family Size	-.906	-.887	-.999	-.921	-1.040
Percent Catholic	.449	.473	.467	.548	.537
Mean Family Income ($1,000's)	.541	.595	.701	.586	.740
Average Daily Attendance (thousands)	.299	----	----	.273	.251
Reading Score (statewide percentiles)	-.264	-.376	-.398	----	----
Variation in Percentage of College Graduates	a	a	----	a	a
Percentage of Minority Students in District	----	.214	.211	.410	.444

[a]Elasticity was not computed because the sample mean is approximately zero since the variable range includes both positive and negative values.

Notes: 1) N = 650.

2) All elasticities are estimated at the sample means.

Source: Elasticities are derived from regression equations reported in text.
column 1: Table 9, column 1.
column 2: Table 9, column 2.
column 3: Table 9, column 3.
column 4: Table 10, column 1.
column 5: Table 10, column 2.

FOOTNOTES

1. See for example, Milton Friedman, "The Role of Government in Education" in Robert A. Solo (ed.) Economics and the Public Interest (New Brunswick, N.J.: Rutgers University Press, 1955); also Capitalism and Freedom (Chicago: University of Chicago Press, 1962).
For a recent study which examines in detail the issue of family choice and alternative models, see John E. Coons and Stephen Sugarman, Education by Choice: The Case for Family Control (Berkeley and Los Angeles: University of California Press, 1978).

2. U.S. Department of Education, 1980 Digest of Education Statistics.

3. See Robert Inman, "Optimal Fiscal Reform of Metropolitan Schools," American Economic Review, March 1978, for a good discussion of this type of analysis.

4. The classic discussion of the "voting with one's feet" is found in Charles Tiebout, "A Pure Theory of Local Government Expenditures," Journal of Political Economy, October 1956.

5. For some empirical support for this statement, see Jack W. Osman and John M. Gemello, "Decision-Making at the Local Level: California School Referendum Issues," Western Tax Review, Fall 1981.

6. High income and high education individuals tend to participate in the political process in disproportionate numbers and otherwise influence local outcomes in more than proportion to their numbers. Thus, it is not surprising that school district expenditures are more closely tied to mean rather than median incomes. See Jack W. Osman and Norton Grubb, "Adjustment from Disequilibrium in Local Finance: School Referenda in California," Childhood and Government Project, University of California, Berkeley, revised 1980 (mimeo).

7. For a similar model, see O. Homer Erekson, "The Demand for Public Education and Private School Enrollments," paper presented at the meetings of the Western Economic Association, June 1980, San Diego, California.

8. See Jon Sonstelie, "Public School Quality and Private School Enrollments" National Tax Journal, June 1979, for a discussion of this issue.

9. The regional variables are dummy variables: if a state falls into a given region, that variable is set equal to one and the other three variables are set equal to zero.

10. This approach was used by Sonstelie, op. cit. He cited work done by Andrew Greeley and others in which they concluded that the Catholic immigration to this country has been a comparatively recent one. In 1963 half of the American Catholic population were either immigrants or the children of immigrants. Andrew Greeley et al. Catholic Schools in a Declining Church, (Kansas City: Sheed & Ward, Inc., 1976)

11. See Osman and Gemello, op. cit. for empirical support of this statement.

12. We are grateful to John Walker for pointing out this possibility to us.

13. Greeley, et al., op. cit.

14. Erekson, op. cit.

15. Stephen A. Hoenack. Private Demand for Higher Education in California. University of California: Office of Planning and Analysis, 1967.

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